

Claims

- [c1] 1. A system for controlling engine torque in a parallel/series hybrid electric vehicle, comprising:
 - a first control strategy embodied within a first controller to determine a modified engine torque signal from at least a desired engine torque signal; and
 - a second control strategy embodied within a second controller to determine variables for air, fuel and spark from said modified engine torque signal.
- [c2] 2. The system according to claim 1, wherein said first controller comprises a proportional integral (PI) controller.
- [c3] 3. The system according to claim 2, wherein said first control strategy determines said modified engine torque signal from said desired engine torque signal and an estimated engine torque signal.
- [c4] 4. The system according to claim 3, wherein said estimated engine torque signal is determined from at least an estimated generator motor torque signal.
- [c5] 5. The system according to claim 3, wherein said estimated engine torque signal is a function of an estimated generator motor torque signal, a generator motor speed signal and an engine torque loss signal.
- [c6] 6. The system according to claim 3, wherein the difference of said desired engine torque signal and said estimated engine torque signal is used to create an engine torque error signal that is used by said PI controller to determine said modified engine torque signal.
- [c7] 7. A method for controlling engine torque in a parallel/series hybrid electric vehicle, comprising the steps of:
 - determining a modified engine torque signal from at least a desired engine torque signal; and
 - determining variables for air, fuel and spark from said modified engine torque signal.

[c8] 8. The method of claim 7, wherein said step of determining a modified engine torque signal from at least a desired engine torque signal comprising the steps of:

determining an estimated engine torque signal; and
determining said modified engine torque signal from said desired engine torque signal and said estimated engine torque signal.

[c9] 9. The method of claim 7, wherein said step of determining a modified engine torque signal from at least a desired engine torque signal comprising the steps of:

determining an estimated generator motor torque signal;
determining a generator motor speed signal;
determining an engine torque loss signal;
determining an estimated engine torque signal from said estimated generator motor torque signal, said generator motor signal, and said engine torque loss signal; and
determining said modified engine torque signal from said desired engine torque signal and said estimated engine torque signal.

[c10] 10. The method of claim 7, wherein said step of determining a modified engine torque signal from at least a desired engine torque signal comprising the steps of:

determining an estimated engine torque signal;
determining an engine torque error signal from a difference between said desired engine torque signal and said estimated engine torque signal;
using a proportional integral controller to operatively act upon said engine torque error signal to determine said modified engine torque signal.

[c11] 11. A method for controlling engine torque in a parallel/series hybrid electric vehicle, comprising the steps of:

deriving a modified engine torque signal from at least a desired engine torque signal; and
deriving variables for air, fuel and spark from said modified engine torque

signal.

[c12] 12. The method of claim 11, wherein said step of deriving a modified engine torque signal from at least a desired engine torque signal comprising the steps of:

- determining an estimated engine torque signal; and
- deriving said modified engine torque signal from said desired engine torque signal and said estimated engine torque signal.

[c13] 13. The method of claim 11, wherein said step of deriving a modified engine torque signal from at least a desired engine torque signal comprising the steps of:

- determining an estimated generator motor torque signal;
- determining a generator motor speed signal;
- determining an engine torque loss signal;
- deriving an estimated engine torque signal from said estimated generator motor torque signal, said generator motor signal, and said engine torque loss signal; and
- determining said modified engine torque signal from said desired engine torque signal and said estimated engine torque signal.

[c14] 14. The method of claim 11, wherein said step of deriving a modified engine torque signal from at least a desired engine torque signal comprising the steps of:

- determining an estimated engine torque signal;
- deriving an engine torque error signal from a difference between said desired engine torque signal and said estimated engine torque signal;
- using a proportional integral controller to operatively act upon said engine torque error signal to derive said modified engine torque signal.

[c15] 15. An article of manufacture for controlling engine torque in a parallel/series hybrid electric vehicle, comprising:

- a computer readable storage device;
- a plurality of strategies in computer readable format embodied in said computer readable storage device for directing a computer to control the

steps of determining a modified engine torque signal from at least a desired engine torque signal and determining variables for air, fuel and spark from said modified engine torque signal.

- [c16] 16. A parallel/series hybrid electric vehicle, comprising:
a first control strategy embodied within a first controller to determine a modified engine torque signal from at least a desired engine torque signal; and
a second control strategy embodied within a second controller to determine variables for air, fuel and spark from said modified engine torque signal.
- [c17] 17. The parallel/series hybrid electric vehicle according to claim 16, wherein said first controller comprises a proportional integral (PI) controller.
- [c18] 18. The parallel/series hybrid electric vehicle according to claim 17, wherein said first control strategy determines said modified engine torque signal from said desired engine torque signal and an estimated engine torque signal.
- [c19] 19. The parallel/series hybrid electric vehicle according to claim 18, wherein said estimated engine torque signal is determined from at least an estimated generator motor torque signal.
- [c20] 20. The parallel/series hybrid electric vehicle according to claim 18, wherein said estimated engine torque signal is a function of an estimated generator motor torque signal, a generator motor speed signal and an engine torque loss signal.
- [c21] 21. The parallel/series hybrid electric vehicle according to claim 18, wherein the difference of said desired engine torque signal and said estimated engine torque signal is used to create an engine torque error signal that is used by said PI controller to determine said modified engine torque signal.